# The Mining Journal

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## Where are we Getting to with Tin ?

THE result of last week's meeting of the International Tin Council was no doubt a disappointment to Bolivia and those other producing countries which had hoped to negotiate a uniform increase in the level of the "tranches" in the Tin Agreement, as in the event all that has occurred is a contraction in the spread of the tranches below the upper limit of £880 per ton at which the buffer stock manager must still sell—if he has any stocks! The floor price has now been raised from £640 to £730 per ton with the result that the lower third price range (discretionary buying) becomes £730 - £780; the middle third (no buying or selling) becomes £780 - £830; and the upper third (discretionary selling), becomes £830 - £880.

Nevertheless, although the upper limit remains unchanged, it is difficult to escape the impression that the net result of last week's meeting will be slightly inflationary, rather than productive of any substantial buying by the buffer stock manager. In the week before the Tin Council met, cash tin was standing at around £765 while on the strength of the Council's decision, it was up to £795 on Monday of this week; i.e. above the limits of discretionary buying even on the revised tranches.

The fact is that, whatever the position may be later on in the year, cash tin is still tight and any prospective buying by the buffer stock manager is almost bound to raise the price at least to the point where he is squeezed out, which in effect is what has happened this week.

In practice, of course, it by no means follows that the buffer stock manager would have come into the market had the price remained below £780; as although there is a natural anxiety that he should acquire stocks as quickly as possible so as to be able to control prices above the £880 level, it has to be remembered that the manager's mandate under Article IX of the Tin Agreement is to buy cash tin in the lower third range "if he considers it necessary to prevent the market price from falling too steeply".

The manager has equally to consider that there is in any case not going to be all that much surplus tin for him to absorb anyway this year (10,000 tons looks like being the limit), and that his problem is, therefore, how to acquire this as cheaply as possible. This is a point of some importance bearing in mind that the contributions, which he has received from the producing countries have been almost entirely in cash at the rate of £640 per ton. Although this should theoretically yield him 15,000 tons on conversion, in practice it looks as if he is going to be lucky to be able to buy 12,500 tons with these funds, so he will presumably have to rely on profits from market dealings to purchase the remainder.

*The Times* has, in our view, been right in stressing recently that in essence the tin industry's problem is not one of oversupply but of under-consumption. Last year's world consumption, excluding China and Russia, was around 157,000 tons, which is almost exactly the average consumption for the five years immediately preceding World War II. It is only necessary to compare this state of affairs with the tremendous increases in the consumption of practically every other industrial metal, to draw

the obvious conclusion, that for so industrially useful a metal to have made virtually no progress in 20 years, there must be something wrong with its price in relation to alternative materials.

The Tin Agreement has certainly assured the continued price stability which the American stockpile offtake has given the industry over the past three years (delicacy forbids us from searching further back into history), but it has yet to be seen whether this stability will be at a level which will give sufficient encouragement to the development of the new uses which energetic tin research has lately been developing.

It also seems pertinent to consider what is likely to be the consequence of assured higher prices. To what extent is it going to result in sustaining the marginal producer and encouraging the opening up of new ground, and how far it is merely going to add fuel to the inflationary spiral and result in new wage demands being made and met where, in the absence of price control, they might never have been made? We know that operators of some of the Congo alluvial deposits, where the labour content of production costs is relatively high, are concerned to exploit these areas as rapidly as possible before rising labour costs render them uneconomic. It is, however, a moot point how far last week's negotiations on the Tin Council will prove to have arrested this trend. Again, judging from the reports on Bolivian mining which have been published by Ford, Bacon and Davis, it seems fairly certain that far more will be achieved by the reorganization of the industry on more efficient lines than by increasing the producers' gross take.

We find it difficult to believe that, in the long term, tin supplies need present any major problems. Even without allowing anything for increased Bolivian production through better management, it is difficult to believe that the Congo, and to a lesser extent Indonesia and Thailand, could not add substantially to world production if demand seemed likely to justify such an increase, while in the case of Malaya, the backlog of prospecting has as yet hardly begun to be tackled and who is to say what the growth potential would be in that country as the result of an intensive prospecting programme?

Some economic "laws" have an annoying habit of proving to be immutable. One of these is that you can try to stabilize prices or stabilize consumption, but that you cannot do both at once—at any rate in a free economy. It is for the producers to decide whether, in the long run, increased consumption or higher prices is in the industry's best interests.

## DARK ECONOMIC OUTLOOK FOR CHILE

It was always an interesting speculation as to what would happen in Chile when the inevitable downturn in the copper price arrived. Would the country remain solvent, would the Klein-Sachs reforms still stand and would the government survive? Speculation becomes even more pertinent now that the elections are over, as any assessment of future Chilean copper policy must be considered in the context of the country's present difficult economic situation.

Before discussing the elections it would be well to recall the economic background against which they took place. The Klein-Sachs programme had run just about a year. It was having some success. In 1955 the wage and cost of living indexes rose 90 per cent whereas in 1956 they rose only about 40 per cent. However, the success of 1956 was crammed into the first half of the year.

In August, for example, farm credit operations were exempted from the loan limits set as recently as June to restrict credit. There were other relaxations of credit. In August, too, Sr. Herrera resigned as Minister of Finance and of Economy—he had been a staunch upholder of Klein-Sachs doctrine. The new minister announced that the budget would not be met and also that retrospective pay increases for the armed forces would be necessary.

All this led to a sharp increase in inflationary pressure. After six months the cost of living index had risen only 13.8 per cent but after ten months it had risen 37.2 per cent. When a free market was set up in April the peso rate was slightly above 400, by the end of the year it was well over 600 to the dollar. At the turn of the year there were the enormous wage increases in the copper mining industry and increases to the salaries of all privately or publicly employed people although these were limited to around 80 per cent of the cost of living increase of the previous year.

On top of this very difficult situation came the fall in the price of copper, and hard on the heels of this came the election at the beginning of March.

The result of the election, which was for 20 out of 25 seats, in the Senate and for all the 147 places in the Congress, was a defeat for the party of President Ibanez. First results showed that big gains were made by the Radical Party which had ruled Chile from 1938 to 1952 when it was defeated by the coalition that put Ibanez in office. As the results continued to flow in it was found that the most spectacular gain was made by Senor Eduardo Frei who heads a party based on West European Christian Democrat lines but which is misleadingly called the Falange (it is nothing like the Spanish Falange). The Agrarian Labour party which supports Ibanez, lost half its seats although some of the more right wing parties supporting him, such as the Liberals (who in Chile stand on the extreme right) and the United Conservatives, held their ground. The Communists and the extreme Left all lost. Overall, there was a swing towards the Centre with the Falange and the Radicals emerging as strong parties and with the Radicals at least pledged to overthrow the economic policy of Ibanez.

It is a fair interpretation that the government relaxed its anti-inflation policy just before the election in the hope of winning support but, in fact, the inflationary pressure touched off appears to have strengthened its opponents. What must now be open to doubt is whether the new government has either the will or the power to re-apply an anti-inflationary policy with the vigour that the situation demands.

The possibility of a vigorous government policy is made more remote by the spectacular personal success of Senor Frei who succeeded in gaining the largest vote of any candidate in the heavily-populated Santiago area. With the presidential election due in September of 1958 Frei emerges as a man of stature capable of toppling Ibanez.

Once again, therefore, the economic outlook for Chile has darkened, but as Bache and Co. comments in its report, "The Chilean Copper Situation in 1957," the copper companies need not fear inflation so long as they can obtain a reasonably realistic rate of peso exchange. According to Bache and Co. the companies, who are entitled to pesos at the free rate, have not insisted on the free rate but, at least till the end of 1956, were satisfied with an exchange of 300 pesos to the dollar. If, however, the companies insist on their right, they could finance their peso requirements this year at a smaller dollar cost than in 1956.

The one thing that stands in Chile's favour is that vast plans for expanding copper output exist and the mines

have been kept reasonably free of strikes. But it does not seem that, with copper at its present price and the government in its present weakened state, that the economic outlook for the country can be very bright.

## "IT ALL DEPENDS ON WHAT YOU MEAN . . ."

It was not long ago that Sir Ronald Prain was in New York making some fascinating observations on the relative costs of producing copper in the United States and on the Copperbelt. Last week, Mr. Roy Glover, in a speech likely to scare the pants off any American copper consumer who was trying to live off his inventory, flatly denied what Sir Ronald had said.

To get the record straight it is perhaps worthwhile repeating what Sir Ronald did in fact say on two occasions —first to American stockholders of R.S.T. and secondly to the American Institute of Mining, Metallurgical and Petroleum Engineers. Speaking to stockholders on February 5 he said, "I have calculated that for the year 1955, which is the the last full year for which results are available, the costs of producing copper in Rhodesia on a weighted average basis were about 1 c. per lb. higher than the weighted average cost for the United States. It is as well that this fact should be recognized". Two days later to the Institute he said, "At the risk of over-simplification I can state that during the year 1955 the average costs on the Copperbelt were over 19 c. per lb. of electrolytic copper compared with about 18¼ c. per lb. average cost of production within the United States. The exactness of these figures is open to question, but I do not think that the generality is so, and if any of you disagree with this generality, I should be very interested to discuss it".

Mr. Glover, chairman of Anaconda, denied that these figures were true but kindly added that they were "made in good faith but without adequate information". He himself said that, on the basis of 1956 costs, 150,965 tons, or 13.9 per cent, were produced at 30 c. per lb. or higher; 245,484 tons (22.6 per cent) had costs of 29 c. per lb. or higher; and 359,451 tons (33.1 per cent) had costs of 25 c. per lb. or more. Mr. Glover went on to say that it was untrue, as had recently been stated, that 90 per cent of American copper can be produced at or below a level of 25 c. per lb.

There are the two views. How far can they be reconciled? It is not being unfair to either of these eminent miners to say that the contexts of their remarks need to be taken into account. Sir Ronald was anxious to dispel the idea that the Copperbelt was the world's lowest cost producer and he was addressing his remarks not only to his immediate hearers but probably also to the people back in Salisbury who like to slap on whacking freight rates for transporting copper. It is certainly all too easy for the Americans to underestimate the difficulties of deep mining of copper, and particularly the problem of water, especially as the Copperbelt ores must seem to Americans to be wonderfully rich.

Mr. Glover, on the other hand, wanted to warn the copper consumers that they were getting their metal dangerously cheap; that unless they agreed to pay more some mines would have to close (a move not to be confused with shutting a property to prop up the price); and that those who had been living off inventory had got those inventories "dangerously low". This is not meant to imply that the figures of either were "cooked" but that the contexts might have influenced the choice of bases for making comparisons.

In this connection it will be observed that the two are comparing different years. When Sir Ronald Prain spoke in early February, he had only 1955 figures by him. When Mr. Glover spoke in the last week of March, he had the 1956 figures. Whether the 1956 figures would show Mr. Glover's case in a more favourable light (i.e., that in 1956 American production costs rose relatively more than those of the Copperbelt) cannot be said without a scrutiny of more figures than we have been given; we should guess, however, that this was so.

The most interesting point, however, is that Mr. Glover, although he denied what Sir Ronald said, does not appear to have disproved it. If 33.1 per cent of 1956 American output had costs of 25 c. per lb. or more, 66.9 per cent must have had costs of less than 25 c. Now what Sir Ronald was talking about was the *weighted average* production cost, and there is nothing mathematically inconsistent with his figure of 18¼ c. per lb., and Mr. Glover's figure of 33.1 per cent produced at 25 c. per lb. or more. Since Mr. Glover set himself the task of refuting Sir Ronald, it seems a great pity that he did not carry on down the scale, giving tonnage and percentage outputs at production costs below 25 c. If he had done so, then we could all have worked it out for ourselves and proved or disproved Sir Ronald's "generality".

If, on the evidence of the brief reports of his speech which have so far reached us, Mr. Glover has failed to produce conclusive evidence in rebuttal of Sir Ronald's assertions, his statement has at least served to emphasize that the production cost of the marginal ton is a much more important figure than the weighted average of the total output. Assuming that Mr. Glover is correct in asserting that 22.6 per cent of American copper becomes uneconomic below 29 c. (and, in fact, it is not clear to us how far this figure may in fact be distorted by government price support contracts), it then seems all the more probable that U.S. producers will make every effort to hold the domestic price at 32 c. Nor should they have much difficulty in doing so, if a drop of 3 c. below that level were to extinguish nearly a quarter of the American production.

## DON'T QUOTE US!

The following jolly little piece, for which we are indebted to *The Denver Mining Record*, may perhaps cheer those of us who are more than usually depressed about the state of the Kaffir market. Under the heading, "Rush for Gold Shares Now Being Predicted", our contemporary writes:—

"A financial expert down in New York, who makes a business of guiding investors into what he believes are investments and speculations with a future, is telling his clients to buy shares in gold mining companies before the rush starts for these securities. Paper money is flooding the world and with this policy of printing paper called money by the novices in government financial matters, the world gets closer to an era like that of the German marks.

"The financial expert down east predicts that there will be a financial smash caused by printing-press money that is only redeemable in like paper money. Gold-backed currency will replace the tons of paper that is now used for money. The gold mines will have to be worked day and night to get out great amounts of the yellow metal for the new currency that will be backed by gold. But unless this is done, according to the expert, the world will have the greatest financial panic in all history and the United States cannot escape if the printing presses continue to add more paper dollars to our national debt now about $276 billion."

# Production of Ilmenite

**In previous issues of the *Quarterly Review of the Australian Mineral Industry*, attention has been drawn to the ilmenite occurrences of Western Australia. The stage of production from these deposits has been reached, shipments being made to Tasmania last December and to an overseas source in January of this year. The following article, condensed from No. 9, Vol. 3, of the *Review*, examines the prospects of this new industry in the west. Dr. Dunn is chief mineral economist, Bureau of Mineral Resources, Geology and Geophysics, Australian Department of National Development.**

*By J. A. DUNN*

*and J. W. MORGAN*

THE principal economic mineral in the Western Australian beach sand deposits is ilmenite (an oxide of iron and titanium), but some rutile, zircon, and monazite are present and will eventually be recovered as by-products.

The East coast deposits do, of course, contain ilmenite but, although the potential production of ilmenite concentrate would be quite large, the association of chrome in quantities too high for satisfactory pigment manufacture has prevented the development of any worthwhile trade in this by-product. The Western Australian deposits, however, are virtually chrome-free and no difficulty is experienced in producing an ilmenite concentrate to satisfy the rather stringent specifications laid down by pigment manufacturers. Further, the titanium content is higher than that of ilmenite concentrate from the East coast deposits.

At present, operations are centred in the Bunbury-Capel district. Cable (1956) Ltd. is working a beach-dune deposit close to Bunbury, on the shores of Koombana Bay, the plant being approximately two miles by rail from the point of shipment. This company is shipping ilmenite concentrate to Japan, and contracts for the delivery of 40,000 tons this year have been entered into.

Western Titanium N.L. has recently commenced production on inland dunes at Capel, some 22 miles by rail south of Bunbury, and the ilmenite concentrate from this plant will be railed to Bunbury for shipment. Late in January the only marketable product being produced was ilmenite, but plans are well in hand to recover also the rutile, zircon and monazite content of the mill feed material. Western Titanium N.L. now has its separation plant in operation on a 24-hr. per day basis, using 12 magnetic separators for a production of 3,000 tons of ilmenite concentrates per month. An additional 12 magnetic concentrators are due to arrive from England and will be in operation before the end of March.

By March, 1957, the installed capacity of these two plants will be approximately 120,000 tons of ilmenite concentrate annually. However, the installation of a second magnetic and electrostatic separator later in 1957, contemplated by Cable (1956) Ltd., will raise that company's capacity to 90,000 tons annually. Also, the possibility of further expansion in capacity will be kept under review by Western Titanium N.L.

Besides the two companies operating at present, Westralian Oil Ltd. are examining the possibilities of entering the industry. This company has leases north of those held by Western Titanium N.L. and others south-east of Capel, those to the south-east of Capel are served by a branch of the Capel-Busselton railway line. An extensive boring and sampling programme has been, and is still, being carried out on the leases south-east of Capel, and it appears certain that if a decision is made to carry on with the project, operations will commence in this area.

Should Westralian Oil Ltd. decide to construct a plant for the production of concentrate, it is probable that by mid-1958 the combined annual capacity of producers in Western Australia will be of the order of 250,000 tons of ilmenite concentrate, approximately equivalent to the annual production in recent years from India which, after the United States, is the world's largest producer of ilmenite. The ultimate reserves of ilmenite in this region of Western Australia have not yet been determined, but sufficient is known to support with confidence the view that the reserves justify the above long-term rate of production. Other deposits north of Bunbury and east of Albany are known, and further finds of this type of deposit may be expected.

### Market Possibilities

We may now turn to the market possibilities. In Australia, the manufacture of titanium oxide pigment at Burnie, Tasmania, has steadily expanded in recent years, on the basis of imports of Indian and, more recently, Malayan ilmenite. However, requirements of ilmenite for this established industry at Burnie will not rise much above 25,000 tons during the next few years. Thus if Western Australian ilmenite producers are to achieve an output of 250,000 tons by mid-1958, a market must be found for around 225,000 tons and the port handling facilities and available shipping must be capable of handling this amount.

Early in the 1930's the world's requirements of ilmenite for all usages were of the order of 50,000 tons, but by 1939, had increased to some 300,000 tons. Since the war, production of ilmenite has expanded rapidly. Production in 1955 was approximately 1,260,000 tons of ilmenite with 680,000 tons $TiO_2$ content.

There was a further increase in 1956. Of the production to-day, U.S. provides about 40 per cent, India about 20 per cent, Norway and Canada each about 12 per cent, and Malaya about 10 per cent. Recent expansion has been at the rate of over 15 per cent annually. Further expansion of production is possible and may be expected; expansion of production from the beach and dune sand type of deposit may be expected particularly in U.S.A., India and Ceylon. More than 50 per cent of the total ilmenite

production is at present consumed in U.S.A., mainly for conversion to titanium oxide for pigment purposes.

With continued expansion of the titanium pigment industry, it is clear that world requirements of ilmenite will continue to increase. In addition to titanium oxide pigment, there is a relatively small consumption of ilmenite for alloys, titanium carbide, and welding rod-coatings, and recently some has been used for titanium metal production. As with pigment, consumption for these purposes will grow and particularly for the production of titanium metal. However, by far the dominant requirement for many years to come will be the pigment industry.

Recent work on the extraction of $TiO_2$ from ilmenite, carried out by the C.S.I.R.O., gives promise of a much increased use of ilmenite. Although still in the laboratory stage, indications are that costs will be competitive with naturally occurring rutile. Should it be possible to produce a pigment grade material by the process, at a cost substantially below that of the present process, a considerably wider use of titanium pigments seems certain.

The projected Western Australian production would represent less than 20 per cent of the present world total industrial absorption of ilmenite. Assuming that the production in Western Australia is competitive, then there would seem little doubt of its finding a place in world in-

# in Western Australia

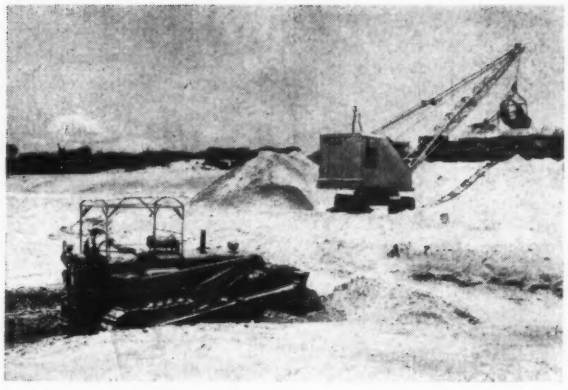
dustry. Its ability to compete in world markets depends on two broad factors—the cost of production, and shipping costs and facilities.

### Problems of Production

It is inadvisable here to enter into detailed production costs; anticipated Western Australian costs are estimates until production is well established. But, from the information available to the writers, there seems little doubt that the costs of mining and concentrating ilmenite in the Bunbury-Capel area will compare favourably with such costs in other countries. The quality of the concentrate will also fully satisfy consumer specifications. Further, the deposits are most favourably situated with respect to a shipping port.

For the present, there are shipping problems which must be solved. During 1957, the bulk of the ilmenite shipped oversea will be to Japan; shipping facilities have already been arranged for a substantial tonnage at rates which are quite favourable. Many enquiries have been received from Europe, and, as further production becomes available, the shipping position to Continental countries (obscure for the present) represents a problem the successful early solution of which could well advance the development of the industry.

The permanent markets for Australian ilmenite are likely to be Europe, United Kingdom, and perhaps the west coast of the United States. Such shipments will, it seems probable, have to be made on a charter basis, which, under



**Diesel-driven dragline in Australia loading beach sands into an ore train**

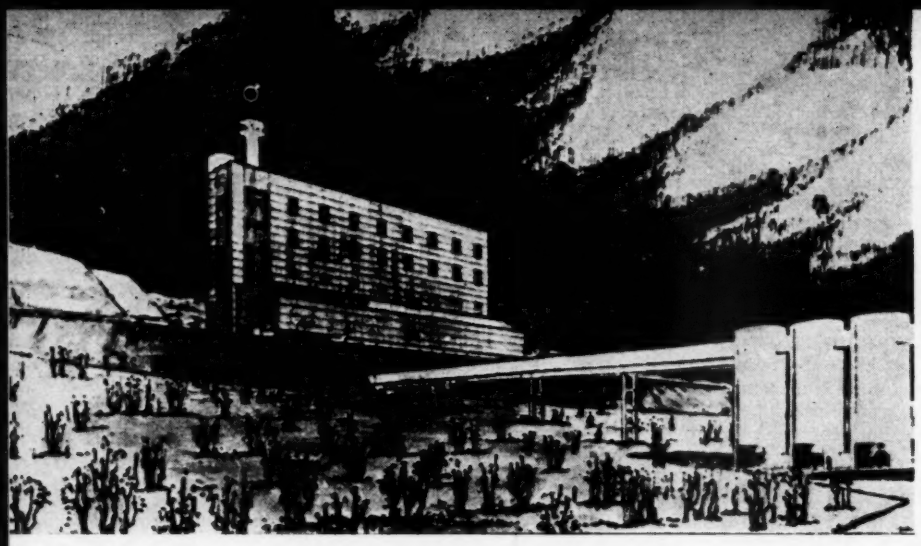
present conditions, would involve freight charges in the range of 180s. - 200s. stg. a ton. At the moment freight charges from India and Malaya are indefinite, some quotations are certainly higher than Australian whilst shipping is diverted around the Cape, but in the long run they are likely to be more favourable than from Australia.

Since 1950, the price of ilmenite in the U.K. has risen from £stg.6 - 7 a ton, c.i.f. to around £stg.12 10s. in recent months. No great recession from this price is expected—with increased demand and higher freight rates some further increase might be expected. With freights to Europe in the range quoted in the above paragraph, and with quotations on a c.i.f. basis in the £stg.12 - 12½ a ton range, the margin of profit would be problematical.

However, it is understood that enquiries have been received from Europe for the purchase of concentrate on a f.o.b. basis, the quotations being more favourable than those indicated above. A factor which may be of particular significance in the future pattern of the world ilmenite trade is the stable Australian political climate—it could well be that European buyers may appreciate the significance of that factor in the trade conditions of to-day.

### Titanium Pigment

However, what perhaps may be of greater importance is, not the establishment of an export industry in ilmenite, but the establishment, on the basis of these newly found reserves, of a large-scale titanium pigment production and export industry. The deposits are favourably situated for the establishment of such an industry close to Bunbury, the freight and shipping problems become minimized if titanium oxide is shipped rather than ilmenite. Maybe the marketing competition for a finished product would be greater than for ilmenite, but should it be any greater for an Australian manufactured product using local raw materials than for a European product for which the raw materials are imported? The longer the period during which oversea oxide plants are established on such ilmenite imports as those from Western Australia, the more difficult will it be for an Australian oxide producer to enter the oxide market. The most favourable opportunity may be now, in the early stages of ilmenite production. From the investor's point of view, the establishment of such an industry does warrant careful and immediate attention. From the national point of view, there is a very great export earning difference between ilmenite marketable in Europe at £stg.12 10s. a ton and titanium oxide at £stg172 a ton. The examination of the possibilities of such an industry would desirably extend to related developments in the West, particularly of pyrite for acid purposes.



**An impression of the central housing and separation plant**

# The Biggest Ore Dressing Plant in The World

*The huge ore-dressing plant in the Swedish Arctic ore fields at Kiruna—under construction since 1954—has recently been put into use. When fully completed it will have eight pairs of magnetic dressing sections—each pair having a capacity of 500 tons per hour. It will be the world's largest plant of its kind, and is said to be technically ten years ahead of general development in this field. The total cost will amount to over Kr.50,000,000 (£3,400,000). The complete plant has been designed and built by Swedish building and engineering firms in collaboration with the staff of the L.K.A.B. and Grängesberg mining companies.*

THE new ore dressing plant at Kiruna will be officially inaugurated on October 1, 1957, in connection with the nationalized LKAB's take-over of the Kiruna ore fields and adjacent iron ore mines at Gallivare-Malmbergot from the Grängesberg parent company. The 11-storey building, which is 375 ft. in length and 170 ft. in height with a width of 96 ft., is one of the major units created as part of the gradual conversion of the mines from open cast to underground mining.

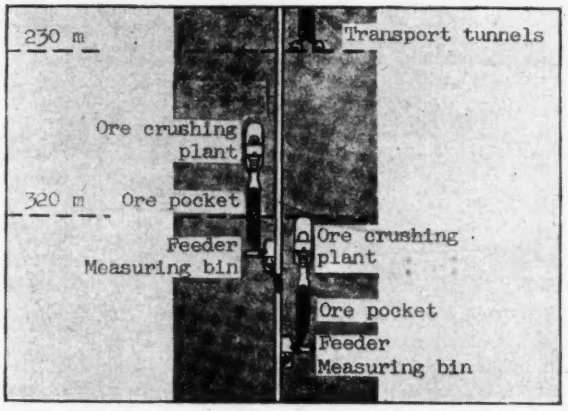
Open cast mining has been going on at Kiruna and the adjoining orebodies—the largest high-grade iron ore deposits in Europe and possibly in the world—since the end of last century. By 1960 surface mining will be finished. The plans for the future utilization of the ore fields call for a heavy increase in output—from the 1956 high of 10,000,000 tons for the entire area to a capacity of 15,000,000 to 20,000,000 tons annually. Thanks to the highly mechanized methods introduced, this increase in output will be realized without requiring a corresponding increase in manpower.

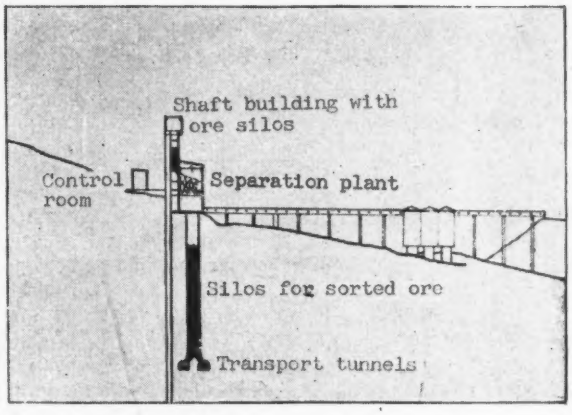
The total capacity of the new dressing plant, which is called the Central Plant, will be 4,600 tons per hour, corresponding roughly to 13,000,000 tons per annum. Each pair of the eight sorting sections is connected with a mine shaft fed by underground crushing stations, at present six in all. In the crushing stations, rock of up to 10-12 tons in weight is reduced to 4-in. pieces. The primary crushers, of Morgardshammar design, have feed openings of 71 x 55 in. and their capacity is 1,000 tons per hour. From the crushing stations the ore first runs down into pockets holding 3,000 tons, two to each crusher. The number of crushing stations and pockets will eventually be doubled.

From the pockets the ore passes through a hopper station into one of the eight skip shafts. Each skip handles a payload of 20 tons, which is hoisted up to the dressing plant by ASEA mine hoists at a speed of 35 ft./sec. The skips are emptied into a system of screens and conveyor belts leading to permanent magnetic units which separate the ore from the rock. Five different qualities are produced, ranging from grade A, which has an iron content of 68 per cent and a maximum phosphorous content of 0.03 per cent, to ore that has a 60 per cent iron content and more than 0.8 per cent of phosphorous.

The barren rock, which makes up about 20 per cent of the bulk mined, is automatically screened off into different sizes for sale as various type of chippings or road-bed rock.

The pure ore is despatched to 12 underground storage pockets, situated directly below the plant. These pockets, about 300 ft. deep and holding some 8,000 tons each, connect through chutes directly with two railway tunnels, which abut on the level of the Kiruna railway yards. The crushed and sorted ore passes by gravity down the vertical




**At left, an enlarged section of the skip shaft with ore crushers, and at right, the central hoisting and separation plant in diagram**

chutes and is drawn off directly into rail cars. These cars hold 35 to 42 tons each and are filled in 30 sec. The trains, which are composed of some 25 cars, are then sampled, weighed and shunted into the marshalling yards.

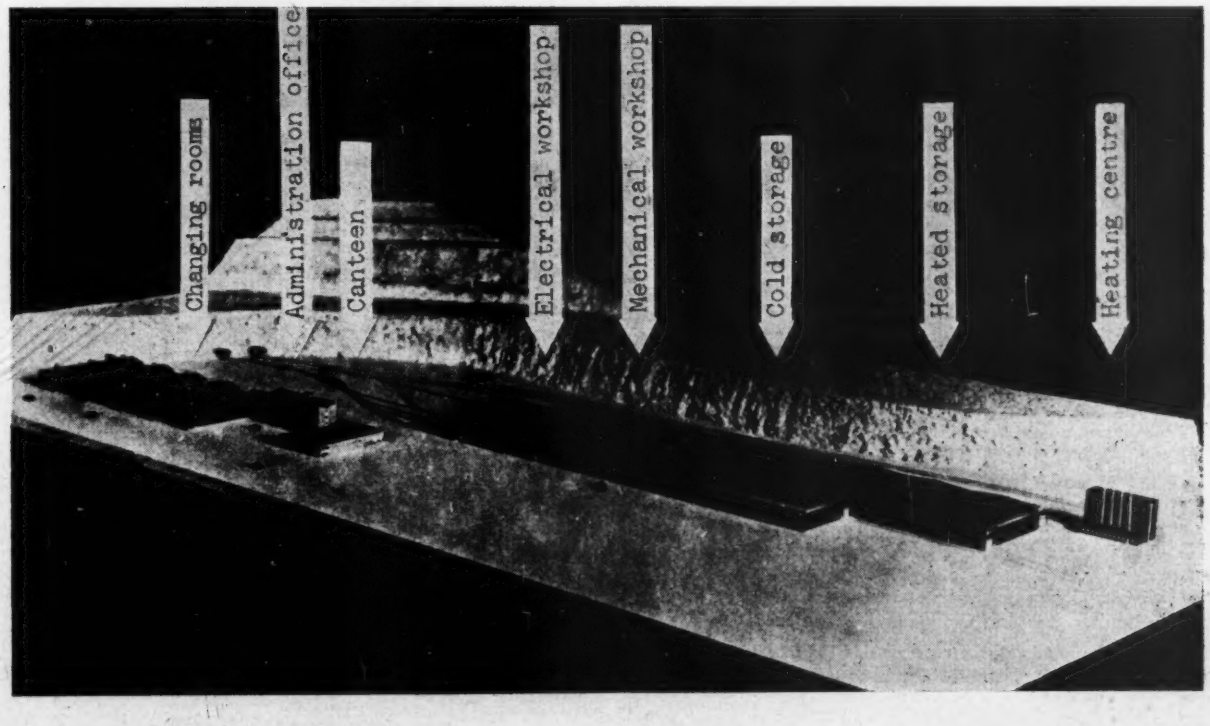
From here the ore is hauled by 5,000 h.p. MV-ASEA locomotives a distance of 106 or 187 miles respectively to the harbours of Narvik or Lulea on the Gulf of Bothnia. The Narvik trains are made up of about 65 cars with an aggregate weight of 3,000-3,500 tons, and there is an average of 17 such trains per day. At Lulea storage facilities are comparatively small, while the new modern Narvik plant, put into full use last year, can accommodate 3,500,000 tons of sorted and graded ore ready to be loaded at a speed of 4,000 tons per hr. into the iron-ore carriers.

The ore dressing plant at Kiruna—along with the Narvik plant—is one of the most impressive of the various rationalization schemes inaugurated in the past few years by the LKAB company. It forms part of an immense investment plan, calling for several hundred million Swedish Kronor. This project also includes a new dressing plant at Vitafors, near Malmberget, new machinery halls, new drilling and hauling equipment, offices, laboratories and a new harbour at Lulea.

Erected by the SIAB company (the Swedish Industrial Building Company) to the designs of the Swedish architect SAR Hakon Ahlberg, the new dressing plant is of special interest from a constructional point of view.

Winter temperatures at Kiruna frequently range between −30 deg. C. and −40 deg. C. (−20 deg. to −40 deg. F.), but the insulation problem has been solved so that the building is heated throughout solely by means of the surplus heat from the electrical machinery that drives the sorting plant. On the outside of the central concrete core —cast in two stages by means of a sliding mould—there is a layer of plastic-treated glass wool, 4 in. thick. Covering this layer there is a lining of corrugated aluminium (1/24th in.).

**An impression of the new workshop area**



# Achievements of the U.S. Bureau of Mines in 1956

**In a statement on February 18, 1957, Mr. F. A. Seaton, U.S. Secretary of the Interior, cited more than eighty achievements as being representative of the recent activities of the U.S. Bureau of Mines. These activities were recorded in the fields of mining, metallurgical and fuels research, and safety factors in the mining industry. The following article outlines a majority of the Bureau's more significant achievements during the fiscal year 1956.**

IN the field of base metals exploitation, copper deposits in Washington and Alaska were sampled by U.S. Bureau of Mines' field crews during 1956. In other efforts to increase the U.S. copper supply, copper recovery from oxide and oxide-sulphide ores was improved. Further experiments were conducted to reduce milling losses of lead and zinc sulphides, while other research was devoted to improving zinc-based alloys.

Invention reports were filed on a vertical amalgam electrode and a new chloride electrolyte for recovering pure metallic zinc from galvanizers' residue, an improved retort was developed for use in vacuum distillation metallurgical processes, and methods were devised for treating complex Alaskan mercury-antimony ores.

In so far as the non-metallic minerals are concerned, Bureau research proved that some domestic phosphate rock can be planer-mined advantageously. Operating experience provided the necessary information for modifying the Bureau-designed phosphate-rock planer, a type of continuous mining machine.

### The Ferrous Metals and Alloys

Work on the ferrous metals and ferro-alloys was carried on. More than 900 Lake Superior taconite samples were classified. Ore-dressing tests were made on low-grade iron ore from Texas, the Southwest, and the Pacific Northwest, and on titanium-bearing iron ore from Alaska. To improve steelmaking techniques, the Bureau studied high-temperature reactions and the effects of both and rare earths on the physical properties of steel. It also continued work with its top-fired scrap preheater.

Work on manganese included progress in upgrading domestic low-grade ores, delineating an extensive deposit in Arkansas, and discovering that within limits, titanium can be substituted for manganese to counteract the harmful effects of sulphur in steel. Research for recovering by-product cobalt, chronium, and iron from Nicaro, Cuba, nickel ore was conducted for the General Services Administration.

Aluminium-silicon alloys were produced experimentally by smelting off-grade domestic materials not now suitable for alumina production, and commercially pure aluminium was made from them in the laboratory. Laboratory studies yielded further information for improving ways to produce alumina from Wyoming anorthosite rock. New magnesium alloys were developed to encourage greater use of this lightest of structual metals.

Almost pure titanium metal was produced by a new method—electrolytic refining of titanium scrap and off-grade sponge, and titanium tetrachloride suitable for titanium production was produced by treating ilmenite, which is more plentiful than rutile, the ore used for present commercial production of titanium.

For the Atomic Energy Commission, the Bureau analyzed more than 24,000 mineral samples submitted by prospectors and others who believed them to contain fissionable elements. Also for AEC, research was conducted on thorium metal, rare-earth alloys, and beneficiation and hydro-metallurgy of uranium ores, including certain lignites that contain some uranium.

The Bureau's success in recovering columbium and tantalum from tin slags and domestic ores led a private company to build a pilot plant for treating columbium-tantalum concentrates. At the same time, progress was made in developing processes for extracting and producing the rare earths in pure forms.

A co-operative survey of bituminious-coal research possibilities outlined more than 200 possible projects. This study will be useful in formulating a comprehensive coal-research programme in which all interested agencies, public and private, can participate.

Fundamentals of the Fischer-Tropsch process for making synthetic liquid fuels from coal were studied; catalysts giving high-quality gasoline and those giving high yields of gasoline were evaluated. Studies were made on costs and construction materials for using nuclear energy in coal gasification; tests with two simulated (electrically heated) reactors indicated possibilities of reducing the cost of both synthesis and pipeline gases made from coal. The co-operative study of underground gasification of coal progressed, and an industry advisory committee was established to help guide the work.

More than 3,000 tests of permissible and other explosives and hazardous chemicals were made during the year. The consumption of permissible explosives, i.e., those tested and approved by the Bureau for safe use in underground coal mines, rose to 90,338,390 lbs. from 78,490,751 lbs. the preceding year. Some 180 different permissibles were on the active list at the year end.

Two new blasting devices were approved for use in underground coal mines, and techniques were devised for neutralizing the explosion hazard of parked mine cars loaded with fine coal.

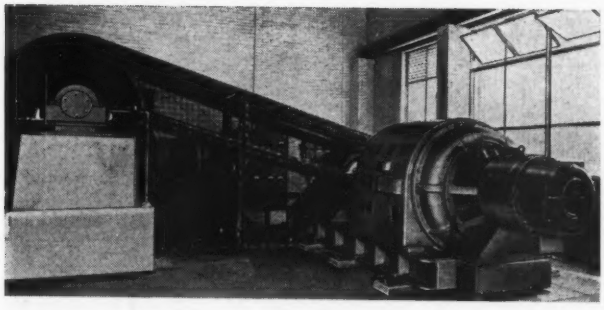
### Underground Safety

Laboratory and field studies to determine the basic principles of mine roof support and make roof-bolting more effective included efforts to systematize the use of compression pads, tests of new types of bolts, and centrifuge studies of rock specimens. Culminating years of research, safety standards were adopted for certifying conveyor belts as fire-resistant and approving power-circuit-fed lighting systems as permissible for safe use in undeground coal mines.

The Bureau's second experimental coal mine was completed at Bruceton, Pa. This mine will be used for dust studies related to health rather than explosion hazards.

Of 19,714 gas samples analyzed, 19,041 were taken during Federal coal-mine inspections.

# Metro-Vickers in 1956



A 750 h.p. 600 r.p.m. AMW slipring motor driving the main ventilating fan at Welbeck Colliery

THROUGHOUT the course of last year Metropolitan-Vickers Electrical Co. Ltd., maintained their tradition of service to the mining industry both in the United Kingdom and overseas. The scope of operations extended to both metalliferous and coal mining activities.

The many types of winder equipments in hand by the manufacturers are some indication of the diverse nature of the equipment required to meet particular winding or site requirements. A large number of winders were commissioned during the year in Britain, South Africa and Australia.

In the United Kingdom, five closed loop a.c. winders with dynamic braking have now been commissioned on automatic operation, and the first closed loop a.c. winder, dating from 1935, has been reconditioned and transferred to Ellington Colliery, where it is now in service. Four of the new winders are 450 h.p. and two 1,225 h.p. A 150 h.p. Stacreep automatic winder has been commissioned for Clydesdale Colliery in South Africa, the third of its type.

The mercury arc rectifier-inverter commissioned in 1955 at Monk Bretton Colliery is of great interest as it fulfils a need met neither by the Ward-Leonard drive with its comparatively high standby losses nor by the direct a.c. drive with its rheostatic losses. So successfully has inversion been achieved that the rectifier system gives a good speed control as a Ward-Leonard equipment and better economy in both running and capital costs.

The first winder employing the Lamex scheme of closed loop speed control, using a laminated exciter with fields fed from a flux-resetting amplifier and a high-response generator-exciter as the final stage, has just been commissioned at Eppleton Colliery. This new method of controlling Ward-Leonard equipments will be used on two 6,700 h.p. winders for Saaiplaas mine, South Africa, the 4,000 h.p. winders at Bowhill No. 3 shaft in the N.C.B., the four-rope, tower-mounted friction winders at the new Bevercotes Colliery in the U.K. and other sites.

Progress on dynamic braking equipments has led to a scheme, now in operation at Graig Merthyr, by which dynamic braking torques can be obtained in values down to zero. This is most important if smooth running is to be achieved on automatic equipments and haulages.

The second 3240 h.p. Ward-Leonard direct coupled automatic winder for the Premier diamond mine has been commissioned in South Africa. This equipment is fitted with an over-current inverse-time relay using transductors operating on the main d.c. circuit, a bi-directional cam gear and biasing unit for automatic winding, and a speed correction scheme to compensate for changes of generator voltage with load.

Over twenty of the company's winders were commissioned in the United Kingdom during 1956.

Many other important orders were received during the year, among them a mercury arc rectifier winder for Peakfield Colliery and a Ward-Leonard equipment for the friction winder at Bevercotes. Among the smaller orders is one for a 60 h.p. portable shaft inspection winder.

The new design of liquid controllers for use with high response oil servo engines is being widely adopted for a.c. winders of 1,000-2,500 h.p., two examples of the range having completed more than a year's service at West Cannock and Walsall Wood. A larger size of flux-resetting amplifier is being developed for use instead of mercury arc rectifiers in the dynamic braking of a.c. winders.

In so far as colliery electrification is concerned, a regular flow of orders has been received from the N.C.B. for all classes of mining motors and control gear, both flameproof and non-flameproof.

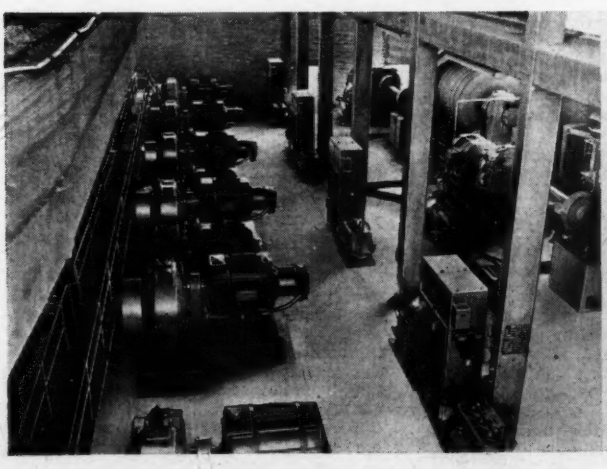
Many AMW sychronous in suction motors of 750 h.p. with LF control gear have been supplied for main ventilating fan drives.

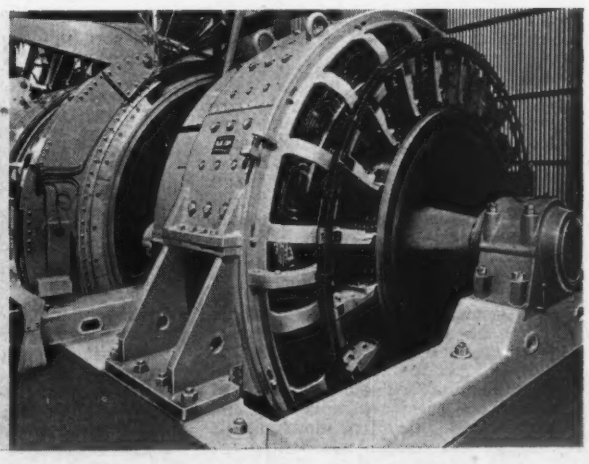
Among overseas orders is one from the Anglo American Corporation comprising two 1,000 h.p. AMW slipring motors with LF control gear and alarm panels for driving the main underground pumps to be installed 1,200 ft. underground at the Bancroft mine, Northern Rhodesia. This is a duplicate equipment to that supplied in 1954, and another repeat order for similar equipment rated at 200 h.p. has been received, also from Anglo American, for driving a Symons cone crusher at Nchanga.

Electrical equipment has been in hand for a variety of plants for handling mine cars, both on surface and underground, and for the landing gear necessary at insets and also when winding without keps or baulks, namely, when friction winders are installed.

Fully flameproof Transwitch units in sizes up to 300 kVA have been certified.

**At left are tube mill drives at Stilfontein G.M., South Africa, and at right one of two 3,240 h.p. automatic Ward-Leonard winders at Premier (Transvaal) Diamond Mining**





*Technical Briefs*

# Explosion-proof Light for Underground Photography

Development of a colour-corrected explosion-proof light for safe use in coal mine photography has been announced by the U.S. Bureau of Mines. The first of its kind to pass the Bureau's rigid testing schedule the light can be manufactured without licence by commercial firms.

Incorporating several unusual features, the air-cooled unit developed by the Bureau's Electrical-Mechanical Research and Development Section uses a special 1,000-watt lamp designed by General Electric Company engineers. It permits the taking of colour photographs without correcting filters and connects directly to permissible - type mine lighting systems as no unit is approved by itself. By using the Bureau's lamp, motion picture and still photographers now can take pictures anywhere in a mine, whether classed gassy or nongassy. The unit is a floodlamp and is not equipped to use flash.

Because of its safety features, the lamp also could be employed in taking pictures in many areas normally forbidden to photographers because of explosion hazards; however, its developers point out that the lamp has only been tested for methane gas and coal dust hazards as found in coal mines.

One of the most difficult problems Bureau researchers encountered in designing the light was to keep all exterior surfaces below the 400 deg. heat limit specified in Bureau testing regulations. This was overcome by using a fan to circulate air inside the housing and equipping the aluminium shell with fins to speed cooling. The entire unit weighs 25 lbs.

## NON-IONIC SURFACE AGENTS

Surface active (wetting) agents are effective at very low concentrations (often only 0.01 per cent) for improving the efficiency of many wet metal treatments, in which, by reducing the surface and interfacial tension of the liquid, they assist penetration, and at the same time improve drainage, thus reducing drag-out and carry-over and increasing the over-all speed of operation.

These advantages are widely recognised, yet the use of such agents has hitherto been limited because they are seldom sufficiently stable in the strongly acid or alkaline conditions common in metal treatment. Belloid M3 and Belloid M7 are non-ionic wetting agents specially developed by Geigy for use in these conditions. Their stability to acids, alkalies and oxidising agents is far higher than that of most anionic or cationic, and even of many non-ionic, surface agents. They are readily soluble in water at all concentrations, though they are normally used at rates as low as 0.01—0.5 per cent. Belloid M3, however, is somewhat less soluble in alkali at the high concentrations used in metal treatment, and is therefore more suitable for use in acid conditions. Belloid M7 can be safely used in strongly alkaline baths.

In acid pickling, cleaning and de-rusting baths Belloid M3 promotes attack on the corrosion products while the basis metal itself is spared. Belloid M7 is similarly effective in alkaline baths, and is a powerful emulsifier of grease. Both are useful in rinsing and phosphate coating, and also in electroplating, where they improve the current efficiency of the bath and accelerate drainage.

## HEAT TREATING COPPER-SILVER ALLOYS

The changes occurring in the mechanical properties of copper-silver alloys during the refining process have hitherto been checked only by testing the variable hardness. Experiments conducted on alloys of different silver content by F. Balazs and Gy. Kilar, and reported in *Hungarian Technical Abstracts* Vo. 8, No. 3, established that tensile strength, limit of elasticity and Brinell hardness did not change parallelly during age hardening. It was also established that the tensile strength of a homogenized and quenched specimen decreased when aged after quenching, while the limit of elasticity and the hardness varied as a function of the length of the ageing time following a curve with a peak.

Limit of elasticity and hardness do not, however, vary parallelly in time, but with ageing at the same temperature hardness reaches its maximum far sooner than the limit of elasticity. The changing behaviour of the various mechanical values of copper-silver alloys during age hardening is attributed to the different effects (strains) to which the material is exposed in the course of the tests. The age-hardening of the examined alloys is explained by the theory of Mott and Nabarro.

## NEW SILICONE COMPOUND

A new publication recently issued by Midland Silicones Ltd., describes the properties and applications of Silicone Compound MS 5. Silicone Compound MS 5, originally developed as a lubricant for silver plated switch contacts and instrument movements, subsequently found many other fields on application due to its ability to retain excellent dielectric properties after long exposure to wet or humid conditions. In addition to its high degree of water-repellency, it is resistant to chemical attack, salt spray and fungi.

The compound, a grease-like silicone material, can be applied by grease gun or by brush or wiping. Light grey in appearance, it maintains a fairly uniform consistency over its working temperatures range of −70 deg. C. to +150 deg. C., and is tasteless, odourless and free from abrasive particles. Silicone Compound MS 5 does not melt, crack or harden at high temperatures and is resistant to oxidation.

The properties of the compound make it suitable for a wide range of applications. It is being used successfully for such differing tasks as filling transistor capsules to provide a dielectric seal against moisture, and coating H.V. porcelain insulators to reduce leakage and prevent flashover.

Reports from America, based on the results of extensive tests and field trials carried out by a major manufacturer of H.V. insulators and a large power distribution company, indicate that a thin film of silicone compound cuts the surface leakage and prevents arcing and flashovers. It is claimed that high surface resistivity is maintained despite contamination by smoke, cement dust, and chemical-containing atmospheres.

## EXTRACTION OF URANIUM

Commercial size installations of new solvent extraction processes resulting from work at the Oak Ridge National Laboratory, United States, are under way.

In a paper before the annual meeting of the American Institute of Mining, Metallurgical, and Petroleum Engineers, it was pointed out that for several years a part of the raw materials programme at the laboratory has been concerned with investigation and evaluation of organic reagents which will permit extraction of uranium, vanadium, thorium and possibly other metals from acidic-aqueous solutions.

As a result of this work, several new solvent extraction processes have been developed for recovery of uranium, vanadium and thorium from ore acid leach liquors Two of these processes have been accepted by the metallurgical industry to the point where some commercial size installations are already in operation and others are imminent.

One process (Amex) employs long chain amines in a suitable diluent such as kerosene and appropriate selection of reagent may be used for recovery and separation of uranium, thorium and vanadium.

## MAGNETIC SEPARATION

Research and development are rapidly making high - voltage and magnetic separation methods important tools in the ore-dressing field. The combination of specific-gravity, high-voltage, and magnetic separation methods has been applied successfully to beach sands for the recovery of titanium, zirconium, and associated minerals for some time. This same combination of ore - dressing methods is now finding use in the production of many other minerals all around the world.

# MINING MISCELLANY

The second uranium mine in the Haliburton-Bancroft area of Ontario, Faraday Uranium Mines, is scheduled to start production on April 15, 1957.

*

Eight Polish coal mining officials were to arrive in the United States this week for a three-weeks' tour of mining facilities in the coal-producing States east of the Mississippi River.

*

Minerals produced in Colorado during 1956 were worth $306,270,000 for the 10th consecutive year. The figure sets a new all-time high record, and is exclusive of uranium.

*

Kennecott Copper is one of the large corporations using solar furnaces in research work. The company uses a furnace at the University of Utah to help improve copper smelting techniques.

*

Reports reaching Vienna say that Soviet experts have been visiting the Krdjali lead/zinc works to plan a 100 per cent in lead and cadmium output and one of 400 per cent in zinc and sulphuric acid output, to be reached by 1958.

*

Technicians of the New Springs Coulee Mining Co., of Canada, have moved to a base camp at Finntown, Co. Donegal, prior to carrying out a widespread prospecting campaign for minerals in various parts of the county.

*

The Messina (Transvaal) Development Company is said to be experimenting with the use of air transport to carry copper concentrates from mines they are developing some 70 miles west of Sinoia.

*

The French State Overseas Mining Bureau has been granted a three-year exploration concession over 4,446 square kilometres in Madagascar. The permit covers the search for muscovite; gem beryl; beryllium, niobium, tantalum and lithium ores; tin and tungsten ores, gold, copper and lead ores.

*

Under an agreement signed last week between Reynolds Metals and the Government of Jamaica, the Group has secured for its subsidiary—Reynolds Jamaica Mines—the right to mine ore for 99 years with the assurance that no export duty will be imposed for 25 years. During this first period the company will pay a royalty which will initially be at the rate of 3s. per l.dry ton on the first 2,000,000 tons shipped each year and 2s. per ton on shipments in excess of this figure. In future years half the royalties will remain pegged while the other half will move in direct ratio to the American price of aluminium. During this 25-year period the Government agrees to impose no other taxes on bauxite operation other than income tax on profit. In this connection a formula has been established whereby, as with royalties, 50 per cent of the taxable profit (initially fixed on a basis equivalent to 11s. per ton) is pegged for the whole period while the remaining 50 per cent will vary with the price of aluminium. Reynolds Jamaica Mines at present has rights over some 60,000 acres and the agreement with the Government provides that mining leases will be granted on any of this land within the next 50 years, but will not be leased to other interests inside of 99 years. It is estimated that by 1960 bauxite exports from Jamaica should be worth £30,000,000 a year which is expected to yield £7,000,000 to the Exchequer.

*

The Ministry of National Economy's mineral consultants, Messrs. Mackay and Schnellmann, state that they are not at liberty to give any information on the reported occurrence of copper in Akaba. They point out, however, that the Akaba area is part of a basal igneous complex, and it would not therefore be surprising if copper mineralisation occurred. It will be clear to the reader, however, that any such occurrences would naturally be in the prospecting stage. Copper was, of course, worked in biblical times in territories now forming part of the Hashemite Kingdom of Jordan.

## PERSONAL

We regret to report the death last week of Mr. G. J. Joel, M.C. Mr. Joel was a director of Johannesburg Consolidated Investment Co. Ltd. and of subsidiary companies, and De Beers Consolidated Mines Ltd.

*

Mr. Robert Annan, chairman of the Consolidated Gold Fields of South Africa Ltd., has been named 1957 recipient of the Egleston Medal, awarded by Columbia University, United States.

*

Sir Eric Mieville has resigned from the boards of Southern Kinta Consolidated and Amalgamated Tin Mines of Nigeria. Lord Colyton has been elected a director of the companies.

*

Lord Colyton has been appointed a director of Metal Industries. Mr. J. T. Rymer is to resign from the board as from March 31.

*

Sir Ulick Alexander has joined the Board of the Rhodesia-Katanga Company.

*

Mr. J. Macpherson has resigned from the Board of Mount Charlotte (Kalgoorlie) Gold Mines.

*

Mr. Walter Wehtje, who will be 60 on April 1, will retire from the Atlas Copco Group on April 13. He joined Atlas Diesel as managing director in 1940. Mr. Wehtje will be succeeded by Mr. Kurt Allan Belfrage, a former Swedish diplomat who is 49.

*

Mr. John Harrison has been appointed managing director of Atlas Copco (New Zealand) Ltd., with headquarters in Wellington.

Mr. D. C. P. Neave has been appointed a director of The British American Metals Co. and elected chairman.

*

Mr. A. R. Neelands, chairman of the Cementation Co. Ltd., returns to-day, after a three-month visit to the subsidiary and associate companies of the Cementation Group in South Africa and Southern Rhodesia.

*

A Mond Nickel Fellowships additional award for 1956 has been granted to Mr. G. F. C. du Plessis, of South African Iron and Steel Industrial Corporation Ltd. to study the preparation of ores by sintering, pelletizing, etc., and the effect on blast furnace practice of the use of prepared burdens.

*

Mr. J. M. Pumphrey, production director of the National Coal Board Northern (N and C.) division, has been appointed deputy chairman of that division, succeeding Mr. H. W. Hembry, who, in January, was appointed a member of the National Board. Mr. J. Brass, general manager of No. 1 (Manchester) area of the North Western division, will succeed Mr. Pumphrey as production director of the division on April 15.

*

The Annual General Meeting of the Cornish Institute of Engineers will be held at the Camborne School of Mines on April 5th at 7.15 p.m.

*

The Second International Congress on Surface Activity is to be held from April 8 to 12, 1957, at the William Beveridge Hall, London University, and the hall of the Institute of Education, Malet Street, London.

*

An Easter vacation lecture course on Nuclear Metallurgy is to be held in the Metallurgy Department of the Battersea Polytechnic from April 9 to 12, 1957.

## CONTRACTS AND TENDERS

The I.C.A. has announced the following future authorizations:

*Korea*

Aluminium and aluminium base alloys and aluminium products, zinc and zinc base alloys and zinc products, iron and steel mill materials, steel mill products and ferro-alloys. Contract period for each commodity 26/2/57 — 31/8/57. Terminal delivery date 28/2/58. Amounts, aluminium $200,000, zinc $200,000 and $100,000, iron $320,000. Ref.: E.S.B. 7137/57/I.C.A. Telephone Chancery 4411, extension 360.

*Iceland*

Code 660 iron and steel mill materials, steel mill products and ferro-alloys. Code 680 miscellaneous iron and steel manufacturers. Contract period 25/3/57—31/8/57. Terminal delivery date 28/2/58. Amount $420,000. Ref.: E.S.B. 7137/57/I.C.A. Telephone Chancery 4411, extension 360.

*Metals and Minerals*

# Britain's Uranium Purchases

Canadian uranium producers will have been cheered by the uranium deal announced following the Macmillan - St. Laurent talks in Bermuda. The communiqué revealed that the U.K. Atomic Energy Authority will purchase between now and 1962 £43,000,000 of uranium from the Eldorado Mining and Refining Co.—the government agency which purchases from the Canadian mining companies. The fact that the States already has an option on Canadian production until 1962 suggests that there were prior consultations between Mr. Macmillan and President Eisenhower. The price at which uranium will be sold is not indicated but it would not be surprising if this contract yielded in total somewhere between 3,500 and 5,000 tons of uranium metal.

★

It has also been announced this week that the U.K. Atomic Energy Authority is willing to buy up to 500 tons annually of uranium oxide from the Central African Federation on the basis of a ten-year contract from the date of the mine coming into production, provided production is not commenced later than 1962. The authority is also prepared to buy a further 100 tons of uranium oxide per annum from small producers over the next seven years.

★

A Japanese company proposes to produce uranium metal. Experimental production is to start in April in a pilot plant constructed by the Atomic Fuel Public Corporation. Later a refinery capable of producing up to 3 tons of uranium metal a year will be built. The Komatsu Manufacturing Co. is planning to develop uranium deposits known to exist in Thailand.

## NICKEL PRICES PAST PEAK

According to Mr. Harold A. Berry, chairman of the committee surveying nickel for the U.S. National Association of Purchasing Agents, domestic and world nickel market prices have probably reached and passed their peak, despite the fact that the metal will remain in short supply for several years.

Similarly, indications this side of the Atlantic are that in the Continental "free" market prices are ranging from £1,800 to £2,000 where until lately they have been well in the excess of £2,000. Similarly, in the U.K. £1,500 is regarded as a maximum with some business being done considerably below this figure.

★

The U.S. Department of Commerce has asked nickel suppliers to develop a new set of distribution rules to "achieve equity" in delivering metal to users. Allocation lists are being revised and Inco is working out plans to see that platers and small users get more market price nickel without hurting established users.

Mr. Maurice Duplessis, Premier of Quebec, announced that 32 companies had been granted permits to carry out intensive exploration over 3,022 sq. miles of territory between Cape Smith and Wakenham Bay. Cape Smith is on Hudson Bay and Wakeham Bay is on Hudson Strait, each being in the northernmost section of the province. Wakeham Bay is about 350 miles south of the Arctic Circle. Mr. Duplessis estimated that the companies concerned had spent a total of $10,000,000 in exploration work.

## N. V. DAVIS WELCOMES EASIER ALUMINIUM MARKET

In his annual statement to shareholders, issued this week, Mr. Nathaniel V. Davis, president of Aluminium Ltd., welcomes the recent easement in the aluminium supply position. As he points out, for the first time for several years producers are in a position to meet current demand and at the same time to encourage by active selling and product research the further growth in the use of aluminium. (In this connection it is significant that in U.K. market circles there is now talk of a possible reduction in prices.) After reciting his group's various production expansion schemes, which have already been outlined in these columns, Mr. Davis goes on to say that "the overall programme has been designed to permit flexibility in construction schedules and the company will be prepared to adjust the rate of expansion in the light of market and other conditions as they may develop". It would be our guess that in the long term this programme is more likely to need to be accelerated than to be retarded.

★

A company to be known as the Forces Hydroelectriques du Bas Congo has been formed to generate power in the lower reaches of the Congo River, and has already placed contracts for plant to the extent of nearly £2,000,000. The intention is that eventually an aluminium smelter should be established at Inga, near the river mouth. Bauxite for this plant will presumably have to come from French territory. Participants in the hydroelectric project are understood to include the Syndicat Belge de l'Aluminium, Péchiney, Ugine, Ste. pour l'Industries de l'Aluminium, Montecatini, Vereinigte Aluminium Werke, Aluminium Ltd. and Reynolds Metals.

★

In Brazil, President Kubitscheck has approved the proposals of the state-owned Companhia Hidroelectrica de San Francisco to supply power to the Kaiser Aluminium Corporation, to manufacture aluminium at Recife or Salvador. The company will obtain bauxite from the recently-discovered deposits in the Amapa Territory. It is thought the scheme will involve barter of metal over a 9-year period in exchange for U.S. surplus grain and will provide for the delivery by Brazil of 500,000 tons of primary aluminium over the next five years.

★

Japanese aluminium producers have concluded a long-term contract with Rumunia Bauxite Ltd. (Malay) for imports of 215,000 tonnes of bauxite, during the fiscal year beginning in April. This compares with 160,000 tonnes under the contract for last year. Japanese imports of bauxite from Indonesia are also expected to increase. Last year they amounted to 120,000 tonnes.

## ZIRCONIUM PRICE FALLING

The U.S. Industrial Chemicals Co., a division of National Distillers Products Corporation, has stepped up the planned production of its multi-million dollar zirconium plant from 1,500,000 lb. to 2,000,000 lb. per annum because of the growth in demand. 1,000,000 lb. per annum of reactor grade zirconium is to be earmarked for the A.E.C. under a five-year contract. This company is now reported to be quoting prices of between $4.75 and $6.50 per lb. according to quantity for its high-purity hafnium-free zirconium sponge, as compared with a price of $12 which obtained until quite recently.

The company has stated that the lower price has been made possible as a result of the success of their sodium process which is understood to be the first successful semi-continuous process for the production of zirconium and which requires a lower capital investment than the Kroll process. Ordinary commercial grade zirconium (suitable for non-nuclear uses) will sell at around $1.50.

## WORLD COBALT POSITION

According to the Bureau of Mines, U.S. Department of the Interior, world production of cobalt increased for the seventh successive year to establish a new peak of about 16,000 s.tons in 1956. World production was 14,600 tons in 1955

Consumption of cobalt in the U.S. declined to 4,781 s.tons in 1956. It was 2 per cent less than in 1955 and also 2 per cent smaller than the average for the five years 1951-55. The decline is ascribed mainly to smaller usage of cobalt in high-temperature alloys, cemented carbides, and ground-coat frit for porcelain enamel. These losses were almost offset by larger usage of cobalt in high-speed steel and alloy hard-facing rods.

Reflecting the smaller demand, U.S. imports of cobalt declined in 1956 to 7,789 s.tons, a 17 per cent decrease from 1955—the record year. Imports of metal from the Belgian Congo, Belgium, Canada and West Germany were smaller, but those from Norway and France increased

### RAIL TARIFF INCREASES

Rail tariff increases effective from April 1 have been announced by Mr. Ben Schoeman, the South African Transport Minister, including the following: Coal 10 per cent, copper ingots 10 per cent; concentrates of base and precious metal ores 10 per cent; chrome ore 2½ per cent, manganese 10 per cent and crude asbestos 10 per cent. The increased tariffs are expected to yield an additional £2,246,000 in revenue.

### PORTUGUESE TUNGSTEN EXPORTS

Exports of tungsten ores from Portugal rose in December, 1956, to 464 tonnes, which compares with 385 tonnes in October and an average of 374 tonnes monthly in 1955. Our correspondent in Portugal ascribes the heavier exports to the desire to clear stock in warehouse before the more gloomy predictions could be fulfilled.

### MINERALS IN CEYLON

Our Correspondent in Ceylon reports that the government has approved the setting up of a National Ilmenite Corporation with an initial capital of Rs.8,000,000. The total annual income expected from this project is Rs. 4,419,000.

The Ministry of Industries has also decided to undertake the refining of high-grade monazite and rutile. The Ministry will shortly purchase a magnetic separator for this purpose, which will be installed at its refining plant at Kalutara, south of Colombo on the west coast. The Department of Mineralogy is already refining a lower quality of monazite from sands at Beruwela.

## COPPER · TIN · LEAD · ZINC

*(From Our London Metal Exchange Correspondent)*

In spite of the industrial position in the United Kingdom, markets have developed a distinctly firmer undertone during the week under review but it is felt that, so far, this is due only to increased enquiry rather than to increased business.

### COPPER FLOOR LOOKS FIRMER

Practically all the influences in the copper market this week have been of a bullish nature consisting as they have of reports of cutbacks in production and in possibilities of strikes. The stocks in U.K. warehouses increased by 300 tons to 3,859 tons and this was just sufficient to establish a contango; and as was reported last week, this situation is considered likely to continue.

In spite of the firm undertone in London, U.S. custom smelters have officially admitted making sales at 30½ c. per lb. and the Belgian producers have reduced their price to the equivalent of 29.40 c. per lb. f.a.s. New York, against the previous level of 29.85 c. per lb.

Reports of strike threats have come from both Chile and Canada: in the former country the workers at El Teniente copper mine are threatening to strike in connection with the negotiations of a new contract which is to replace the current one expiring on March 31 whilst in the latter there is a possibility that the Noranda plant may shut down. It is estimated that a closure at Noranda would mean a loss in output of 8,500 tons a month.

The announcement of a cutback in production comes from the O'Okiep Copper Co. who state that for 1957 the production will amount to 28,000 tons instead of the 33,000 tons produced in 1956; whilst the chairman of the Anaconda Co. has said that the curtailment of 2,000 tons a month announced last autumn is now almost effective.

Mr. Glover also disclosed in his speech that American fabricators had been biting deep into their stocks and that probably as much as 25 per cent of their requirements since September have come from that source: he also gave some interesting figures resulting from a survey of U.S. mining costs which showed that 13.9 per cent of the 1956 production cost over 30 c. per lb.; that 22.6 per cent cost over 29 c. per lb. and that 33.1 per cent cost over 25 c. per lb., and he used these figures to demonstrate that with present consumer requirements, at least a proportion of the output costing over 29 c. per lb. was necessary to the country and that therefore the present level of 32 c. per lb. was not really satisfactory from the producers' point of view.

It seems clear from this and other remarks which have been made in recent weeks that the U.S. primary producers will do all they can to maintain a floor price of 32 c. per lb. and that in fact they will probably make some attempt to raise this as soon as the opportunity occurs.

### I.T.C. DECISION BOOSTS TIN PRICE

The main talking point during the week has been the decision of the International Tin Council to make alterations in the prices governing the Buffer Stock Manager's actions. As forecast last week, the top price of £880 per ton has remained unchanged, but the amount by which the floor price has been raised has come as a great surprise, as the highest estimate before the meeting was £60 per ton, whereas the actual increase is £90 per ton. The result of this is that the zones now cover only £50 per ton and many market people consider that this is likely to cause difficulties if the market is moving rapidly in one direction or the other, as it is felt that a very large tonnage of metal may be neccessary to halt a decline (or to stop a rise) within £50.

The immediate effect on the market was that the price jumped instantly into the neutral zone and a fair amount of business was reported at the beginning of the week. It looks, however, as if the advance was overdone and the price is now vulnerable, more especially so as people begin to realize that if the Buffer Stock Manager adheres to the letter of his instructions, he cannot operate above the floor price of £730 unless he considers the market to be falling too rapidly.

As was to be expected, the first reactions from overseas depended upon whether the speaker was a producer or a consumer and it is a little early yet for any real considered judgment to have been formed. Stocks in the U.K. warehouses unexpectedly declined by 123 tons to a total of 702 tons. On Thursday morning the Eastern price was equivalent to £787½ per ton c.i.f. Europe.

★

According to the *Straits Times* a delegation of Malaya's Chinese tin producers are on a visit to Peking to try to negotiate a sales agreement with Communist China.

### UNCERTAIN OUTLOOK FOR LEAD/ZINC PRICE SUPPORT

The lead and zinc markets have again been featureless, but a number of interesting statistics have become available during the week, the most interesting of which appeared in the report of the St. Joseph Lead Co. that deliveries of domestic material to the U.S. stockpile during 1956 amounted to 160,000 tons of zinc and 75,000 tons of lead. It can therefore be well understood why there is so much talk at the moment about the future of the stockpiling policy.

All that is known so far is that Congress is showing signs of being less generous in voting money for stockpiling purposes and at present almost the whole $130,000,000 requested for this purpose by the General Service Administration has been wiped out. It is not clear what repercussions this will have on lead and zinc, as it is understood that there is still an amount of unused money voted previously and it is also expected that something will be done to maintain the domestic price of lead and zinc in the States.

The diminution in stockpiling and barter business at the end of the year is indicated by the U.S. import figures for January, which show the tonnage of zinc imported at 27,493 tons against 46,452 tons in December, and for lead 31,410 tons against the 40,630 tons, although in the latter case the drop was largely offset by an increase in the imports of ores. Business in America remains at a steady level and the purchase of replacement batteries is still running ahead of the corresponding time for last year; there has also been more interest shown by the galvanizing trades.

In Europe, smelters all report that they are very active, and if it were not for offerings of zinc from behind the Iron Curtain, metal for near delivery would not be easy to obtain: nearby lead is also scarce. In February, the O.E.E.C. countries produced 65,158 tons of zinc which is a drop of some 6,000 tons from January, but this is usual at this time of the year.

In the U.K., demand for both lead and zinc has been almost non-existent owing to the labour situation, but producers have as yet shown no signs of trying to force metal on to an unwilling market.

Closing prices and turnovers are given in the table on page 412.

# COMET

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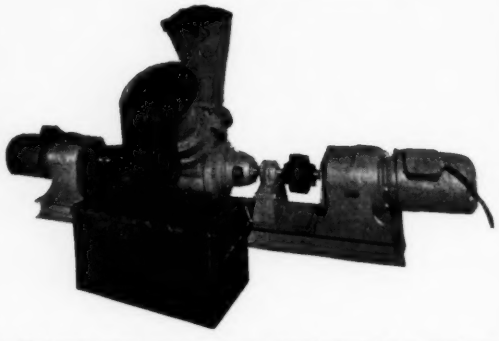

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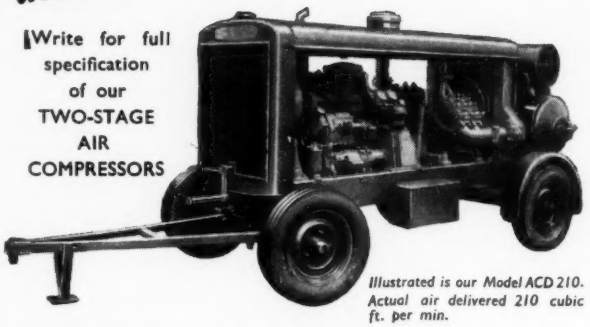

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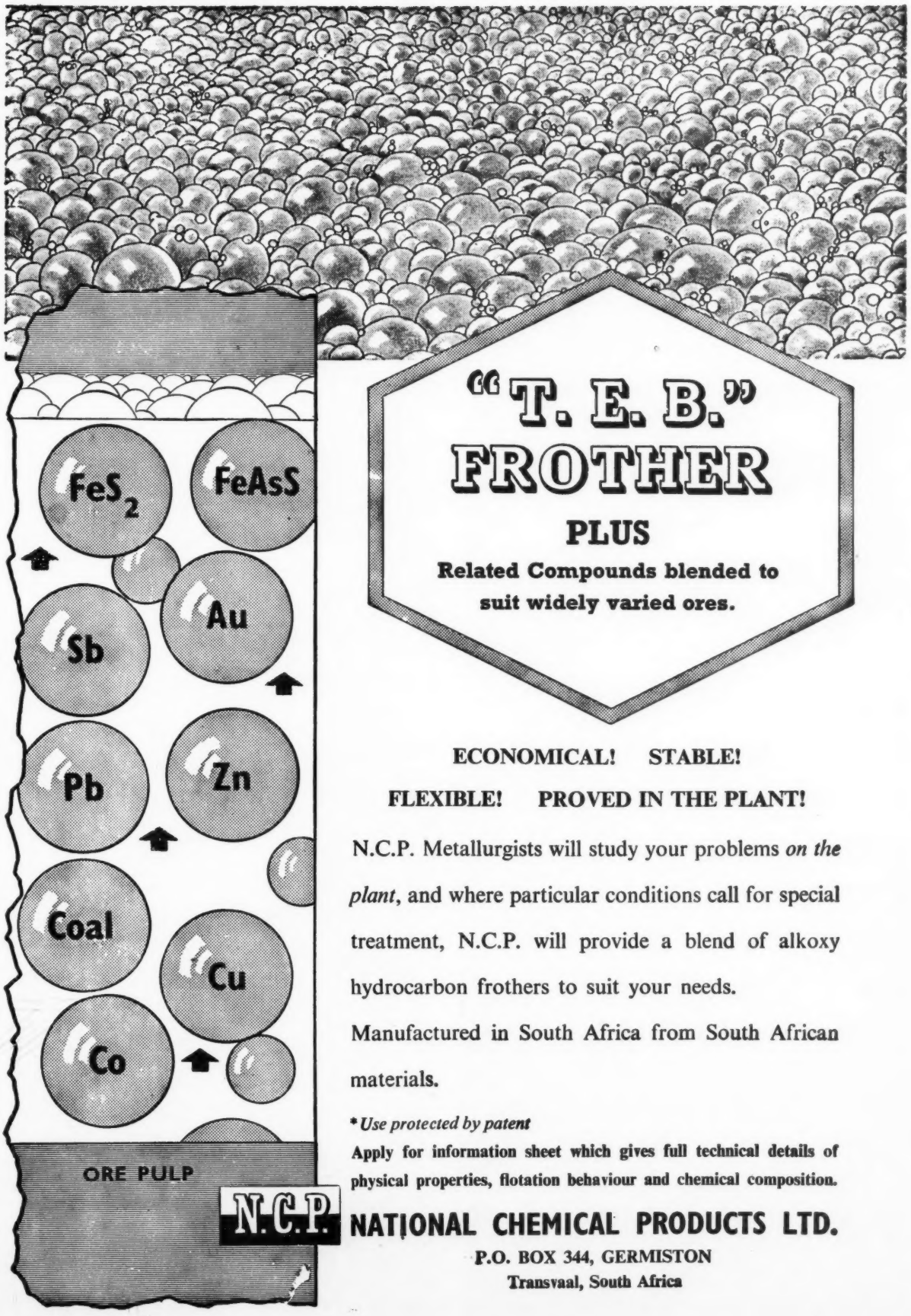


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# LONDON METAL AND ORE PRICES, MARCH 28, 1957

## THE WEEK ON THE L.M.E

| | March 21 Buyers | March 21 Sellers | March 28 Buyers | March 28 Sellers |
|---|---|---|---|---|
| **COPPER** | | | | |
| Cash | £235¾ | £236 | £239½ | £239¾ |
| Three months | £236 | £236¼ | £240 | £240½ |
| Settlement | £236 | | £239½ | |
| Week's turnover | 6,050 tons | | 5,325 tons | |
| **LEAD** | | | | |
| Current ½ month | £113 | £113¼ | £112¼ | £112¼ |
| Three months | £112 | £112¼ | £111¾ | £112 |
| Week's turnover | 1,250 tons | | 3,200 tons | |
| **TIN** | | | | |
| Cash | £771 | £772 | £780 | £782 |
| Three months | £761 | £762 | £769 | £769½ |
| Settlement | £772 | | £782 | |
| Week's turnover | 975 tons | | 1,005 tons | |
| **ZINC** | | | | |
| Current ½ month | £95¼ | £95¾ | £96½ | £96¾ |
| Three months | £94 | £94½ | £94¾ | £94¾ |
| Week's turnover | 2,025 tons | | 2,975 tons | |

## METAL PRICES

Aluminium, 99.5%, £197 per ton

Antimony —
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60%) bases 23s. 6d./24s. 6d. nom. per unit, c.i.f.

Arsenic, £400 per ton

Bismuth (min. 1 ton lots) 16s. lb. nom.

Cadmium 12s. 0d. lb.

Cerium (99% nett), £13 18s. lb. delivered U.K.

Chromium, 7s. 2d. lb.

Cobalt, 16s.-19s. lb.

## ORES AND OXIDES

Bismuth .. .. .. .. .. .. .. .. .. .. 30% 5s. 0d. lb. c.i.f.
18/20% 1s. 3d. lb. c.i.f.

Chrome Ore—
Rhodesian Metallurgical (semifriable) 48% .. .. .. .. £17 8s. 0d. per ton c.i.f.
,, Hard Lumpy (45%) .. .. .. .. .. .. £17 8s. 0d. per ton c.i.f.
,, Refractory 40% .. .. .. .. .. .. £12 15s. 0d. per ton c.i.f.
,, Smalls 42% .. .. .. .. .. .. £16 5s. 0d. per ton c.i.f.
Baluchistan .. .. .. .. .. .. £18 15s. 0d. per ton c.i.f.

Columbite, 65% combined oxides, high grade .. .. .. .. 185s./197s. 6d. per unit

Fluorspar—
Acid Grade, Flotated Material .. .. .. .. .. .. £22 13s. 3d. per ton ex. works
Metallurgical (75/80% $CaF_2$) .. .. .. .. .. .. 156s. 0d. ex. works

Lithium Ore—
Petalite min. 3½% $Li_2O$ .. .. .. .. .. .. £8-£10 per ton f.o.b. Beira
Lepidolite min. 3½% $Li_2O$ .. .. .. .. .. .. £8-£10 per ton f.o.b. Beira
Amblygonite basis 7% $Li_2O$ .. .. .. .. .. .. £28-£32 per ton f.o.b. Beira

Magnesite, ground calcined .. .. .. .. .. .. £28 0s./£30 0s. d/d
Magnesite Raw (ground) .. .. .. .. .. .. £21 0s./£22 0s. d/d
Molybdenite (85% basis) .. .. .. .. .. .. 8s. 5d. nom. per lb. (f.o.b.)

Titanium Ore —
Rutile 95/97% $TiO_2$ .. .. .. .. .. .. .. £64/£65 per ton c.i.f. Aust'n
Ilmenite 52/54% $TiO_2$ .. .. .. .. .. .. £11 per ton c.i.f. Malayan

Wolfram and Scheelite (65%) .. .. .. .. .. .. 160s./165s. 0d. per unit c.i.f.

Manganese Ore Indian
Europe (46%-48%) basis 165s. freight plus 17½% surcharge .. .. .. 145d. nom. per unit c.i.f.
Manganese Ore (43%-45%) .. .. .. .. .. .. .. 116d. nom. per unit. c.i.f.
Manganese Ore (38%-40%) .. .. .. .. .. .. .. 111d. nom. per unit. (including duty)

Vanadium —
Fused oxide 90-95% $V_2O_5$ .. .. .. .. .. .. £12½-£13½ per unit c.i.f.
Zircon Sand (Australian) (65-66% $ZrO_2$) .. .. .. .. .. .. £20 per ton c.i.f.

Germanium, 99.99%, Ge. kilo lots 3s. 4d. per gram

Gold, 250s. 4¼d.

Iridium, £27/29 oz. nom.

Lanthanum (98/99%) 15s. per gram

Manganese Metal (96%-98%) £310

Magnesium, 2s. 5¼d. lb.

Nickel, 99.5% (home trade) £600 per ton

Osmium, £20/22 oz. nom.

Osmiridium, nom.

Palladium, £8 0s./£8 10s. oz.

Platinum U.K. and Empire Refined £33/£34 oz.
Imported £33½/£33¾ nom.

Quicksilver, £86 ex-warehouse

Rhodium, £42 oz.

Ruthenium, £15/£17 oz. nom.

Selenium, 85s. nom. per lb.

Silver, 79¾d. f. oz. spot and 79½ f'd.

Tellurium, 15s./16s. lb.

# LONDON STOCK EXCHANGE PRICES, MARCH 27, 1957

| Finance | Price Mar. 27 | + or — on week |
|---|---|---|
| African & European | 55/- XD | —1/3 |
| Anglo American Corpn. | 6¾ | —⅛ |
| Anglo-French | 21/3 | +3d |
| Anglo-Transvaal Cons. | 26/3 | ..... |
| Central Mining (£1 shrs) | 57/6 | —3/1½ |
| Consolidated G'fields | 56/- | —6d |
| Consol. Mines Selection | 27/3 | —1/- |
| East Rand Consols | 1/4½ | —1½d |
| General Mining | 62/6 | —3/9 |
| H. E. Prop. | 8/- | ..... |
| Johnnies | 39/9 | —9d |
| Rand Mines | 65/- | ..... |
| Rand Selection | 33/1½ | —1/3 |
| Union Corporation | 36/- | —1/6 |
| Vereeniging Estates | 5⅛ | +⅛ |
| Writs | 34/6 | —1/- |
| West Wits. | 32/6 | —9d |
| **Rand Gold** | | |
| Blyvoors | 19/- | ..... |
| Brakpan | 5/4½ | —1½d |
| Buffelsfontein | 31/7½ | —1/3 |
| City Deep | 12/1½ | —7½d |
| Consol. Main Reef | 12/4½ | —6d |
| Crown | 26/9 | —9d |
| Daggas | 30/- | —2/- |
| Dominion Reefs | 17/9 | +3d |
| Doornfontein | 20/9 | —1/- |
| Durban Deep | 21/9 | —6d |
| E. Champs | 3/- | —1½d |
| E. Daggas | 7/9 | ..... |
| E. Geduld (4s. units) | 27/- | ..... |
| E. Rand Props. | 40/6 | —2/- |
| Geduld | 67/6 | —2/6 |
| Govt. Areas | 3/- | +1½d |
| Grootvlei | 16/4½ | —3d |
| Hartebeestfontein | 46/4½ | —1/- |
| Libanon | 6/3 | —4½d |
| Luipaards Vlei | 13/3 | —4½d |
| Marievale | 16/7½ | ..... |
| New Kleinfontein | 3/4½ | —1½d |
| New Pioneer | 18/10½ | —1½d |
| Randfontein | 30/3 | —1/9 |
| Robinson Deep | 6/9 | —1½d |
| Rose Deep | 8/- | ..... |
| Simmer & Jack | 3/9 | ..... |
| S.A. Lands | 20/9 | —3d |
| Springs | 2/- | —3d |
| Stilfontein | 25/3 | —1/- |
| Sub Nigel | 17/6 | —3d |
| Vaal Reefs | 29/10½ | —1/3 |
| Van Dyk | 2/3 | ..... |
| Venterspost | 11/9 | —3d |
| Vlakfontein | 14/- | —1½d |
| Vogelstruisbult | 12/6 | —3d |
| West Driefontein | 4⅛ | —¼ |

| Rand Gold contd. | Price Mar. 27 | + or — on week |
|---|---|---|
| W. Rand Consolidated | 30/- | —1/3 |
| Western Reefs | 27/3 | —9d |
| **O.F.S. Gold** | | |
| Freddies | 5/3 | —3d |
| Freddies Consolidated | 3/- | —3d |
| F.S. Geduld | 65/7½ | —3/1½ |
| Geoffries | 2/10½ | —1½d |
| Harmony | 20/6 | —1/3 |
| Loraine | 4/- | —1½d |
| Lydenburg Estates | 12/- | —3d |
| Merriespruit | 4/3 | —1½d |
| Middle Wits | 7/9 | —4½d |
| Ofsits | 48/6 | —2/9 |
| President Brand | 49/4½ XD | —7½d |
| President Steyn | 27/3XD | —7½d |
| St. Helena | 24/6 | —1/1½ |
| Virginia Ord. | 9/- | —3d |
| Welkom | 13/4½ | —1½d |
| Western Holdings | 62/6XD | —4/6 |
| **West African Gold** | | |
| Amalgamated Banket | 1/3 | ..... |
| Ariston | 4/3 | +1½d |
| Ashanti | 15/10½ | —1½d |
| Bibiani | 2/1½ | ..... |
| Bremang | 1/4½ | ..... |
| Ghana M.R. | 1/7½ | ..... |
| Konongo | 1/4½ | —½d |
| Marlu | ½d | ..... |
| Taquah | 1/1½ | ..... |
| Western Selection | 5/6 | —1½d |
| **Australian Gold** | | |
| Gold Mines of Kalgoorlie | 13/9 | —1½d |
| Great Boulder Prop. | 12/6 | ..... |
| Lake View & Star | 18/9 | —1½d |
| Mount Morgan | 13/9 | +6d |
| North Kalgurli | 7/1½ | —4½d |
| Sons of Gwalia | 1/10½ | +1½d |
| Western Mining | 9/9 | —3d |
| **Miscellaneous Gold** | | |
| Cam & Motor | 7/7½ | ..... |
| Champion Reef | 14/3 | ..... |
| Falcon Mines | 7/6XD | ..... |
| Globe & Phoenix | 23/- | ..... |
| Motapa | 10½d | —1½d |
| Mysore | 3/9 | +1½d |
| Nundydroog | 19/9 | ..... |
| St. John d'el Rey | 45/- | —8/9 |
| Zams | 50/- | ..... |

| Diamonds and Platinum | Price Mar. 27 | + or — on week |
|---|---|---|
| Anglo American Inv. | 8½ | +⅛ |
| Casts. | 24/7½ | —3d |
| Cons. Diam. of S.W.A. | 10/9 | —1½d |
| De Beers Defd. Regd. | 4 11/16 XD | +3/32 |
| De Beers Pfd. Regd. | 14¼ | —¼ |
| Pots. Platinum | 15/- | +3d |
| Waterval | 24/- | —6d |
| **Copper** | | |
| Bancroft | 40/9 | —6d |
| Chartered | 69/- | +1/3 |
| Esperanza | 2/9 | ..... |
| Magundi | 9/3 | —3d |
| Messina | 8 9/32 | +7/32 |
| Nchanga | 11 11/16 | —¼ |
| Rhod. Anglo-American | 4 11/16 | —5/16 |
| Rhod. Katanga | 36/3 | —1/9 |
| Rhodesian Selection | 22/- | —6d |
| Rhokana | 36½XD | —¼ |
| Rio Tinto | 4 7/16 | —3/32 |
| Roan Antelope | 12/3 | +4½d |
| Selection Trust | 4 13/16 | +3/32 |
| Tanks | 7 | —5/16 |
| Tharsis Sulphur Br. | 4¼ | —⅛ |
| **Tin (Eastern)** | | |
| Ayer Hitam | 26/3 XD | +1/1½ |
| Gopeng | 15/1½ | +6d |
| Hongkong | 6/10½ | ..... |
| Ipoh | 17/9 | +3d |
| Kamunting | 10/4½ | +7½d |
| Kepong Dredging | 5/3XD | ..... |
| Kinta Tin Mines | 22/6XD | +1/6 |
| Malayan Dredging | 14/10½ | +6d |
| Pahang | 14/10½ | +6d |
| Pengkalen | 17/9 | +9d |
| Petaling | 6/1½ | ..... |
| Rambutan | 18/9 | +6d |
| Siamese Tin | 13/4½ | +1/1½ |
| Southern Kinta | 18/- | +1/1½ |
| S. Malayan | 10/1½ | +4½d |
| S. Tronoh | 7/4½XD | +6d |
| Sungei Kinta | 21/6 | +1/3 |
| Tekka Taiping | 8/9 | +3d |
| Tronoh | 13/1½ XD | +6d |
| **Tin (Nigerian and Miscellaneous)** | | |
| Amalgamated Tin | 9/4½ | +4½d |
| Beralt Tin | 44/6 | +2/6 |
| Bisichi | 4/3 | +1½d |
| British Tin Inv. | 24/9 | +1/9 |
| Ex-Lands Nigeria | 2/4½ | +1½d |
| Geevor Tin | 21/1½ | +6d |

| Tin (Nigerian and Miscellaneous) contd. | Price Mar. 27 | + or — on week |
|---|---|---|
| Gold & Base Metal | 1/2½ | ..... |
| Jantar Nigeria | 3/4½ | +1½d |
| Jos Tin Area | 15/- | ..... |
| Kaduna Prospectors | 2/- | ..... |
| Kaduna Syndicate | 2/1½ | ..... |
| London Tin | 11/- | +9d |
| United Tin | 1/- | +1½d |
| **Silver, Lead, Zinc** | | |
| Broken Hill South | 73/9 | +1/3 |
| Burma Mines | 3/9 XD | ..... |
| Consol. Zinc | 85/9 | +4/9 |
| Lake George | 10/1½ | +4½d |
| Mount Isa | 29/6 | +3d |
| New Broken Hill | 53/- | +1/3 |
| North Broken Hill | 6 1/16 | ..... |
| Rhodesian Broken Hill | 12/6XD | +3d |
| San Francisco Mines | 25/- | +10½d |
| Uruwira | 4/- | ..... |
| **Miscellaneous Base Metals and Coal** | | |
| Amal. Collieries of S.A. | 2 31/32 | ..... |
| Associated Manganese | 35/3 | ..... |
| Cape Asbestos | 10/7½ | +7½d |
| C.P. Manganese | 25/6 | +1/- |
| Consol. Murchison | 51/3 | +1/3 |
| Natal Navigation | 3 1/32 | ..... |
| Turner & Newall | 117/6 | +7/4½ |
| Wankie | 18/6 | +4½d |
| Witbank Colliery | 5½ | +⅛ |
| **Canadian Mines** | | |
| Dome | $25½ | ..... |
| Hollinger | $49¾ | +½ |
| Hudson Bay Mining | $159 | ..... |
| International Nickel | $202½ | ..... |
| Mining Corp. of Canada | £6½ | —⅛ |
| Noranda | $97 | —7 |
| Quemont | £6½ | —⅛ |
| Yukon | 4/6 | ..... |
| **Oil** | | |
| Apex | 40/9 | +1/3 |
| Attock | 37/9 | +1/- |
| British Petroleum | 151/- | +8/9 |
| Burmah | 98/9 | +9/3 |
| Canadian Eagle | 66/- | +4/3 |
| Mexican Eagle | 21/10½ | —3d |
| Shell | 179/4½ | +5/1½ |
| T.P.D. | 60/- | +7/9 |
| Ultramar | 71/4½ | +5/4½ |

*Mining Finance*

# Rho-Kats' Loan Stock Will Offer Good Investment

A circular from the Kansanshi Copper Mining Company has given details of an arrangement under which it will receive loan facilities up to £500,000. This loan is to bear interest at 5½ per cent per annum on amounts drawn and will be provided by shareholders *pro rata* to their interests. It will carry subscription rights at par over 500,000 Kansanshi shares until July 1, 1960. The funds will be used for repaying advances of £200,000, and for financing further development at the property. The most important Kansanshi shareholders are the Anglo American Corporation of South Africa, with about 41 per cent, and Rhodesia-Katanga with about 35 per cent. The remaining shares are held by Tanganyika Holdings, Selection Trust, the British South Africa Co., and Rhokana Corporation.

Rhodesia-Katanga has stated that it intends to subscribe for its full rights under the Kansanshi issue. The company would normally have been entitled to subscribe for only £176,200 of the loan, but as certain shareholders do not intend to take up their allotments, it is to have the opportunity of subscribing for £196,680.

In order to provide funds for this purpose, Rhodesia-Katanga will—subject to C.I.C. consent—offer its shareholders the right to apply for an issue of Unsecured Loan Stock convertible into shares at any time up to July 1, 1965, at 40s. per share. Application will be made to the London Stock Exchange for an official quotation of the Stock, and the entire issue will be underwritten. Particulars of terms, and of arrangements for underwriting will be announced later.

In the absence of any further details regarding this impending issue by Rhodesia-Katanga, it is difficult to comment with any fairness upon the financial attractions of the scheme. At the same time, it certainly seems that the creation of a Loan Stock with conversion rights should be received favourably by the market. The amount involved is small, and it is likely, therefore, that the stock will be issued in £1 units.

In many ways the Loan Stock, providing as it will an immediate return on money invested, will offer a safer way of participating in Kansanshi's future than the shares. The fact that they are "Unsecured" should not cause undue worry, for it is widely accepted that development work so far carried out at the mine carries every indication that money spent on opening up and plant could easily be recovered—even with copper at or even below its present price. It is therefore possible to regard the issue as being quite adequately covered.

Since the beginning of the month Rhodesia-Katanga shares have seen a weak market mainly because of adverse rumours concerning the need for further money. But the small amount of extra capital which the proposed issue will eventually entail will in the event almost certainly be regarded as unimportant. Initial production results from Kansanshi have not come up to expectation due to no small extent to the recent sharp falls in copper prices. Yet, underground development which is being pushed ahead with the object of proving that substantial deposits of sulphide ore exist at depth, has been encouraging, and has certainly given no reason to doubt that the mine has a most promising future. Rhodesia-Katanga £1 shares at present stand at 37s. compared with a high point of 56s. in 1956.

## ANGLO'S 1 FOR 10 BONUS ISSUE

Besides maintaining its annual dividend for 1956 at the previous year's level of 70 per cent, the Anglo American Corporation of South Africa has announced its intention of capitalizing £391,767 from reserves and issuing bonus shares in the ratio of 1 for every 10 held at the close of business on April 25. While not entirely unexpected this "tax-free dividend" has been warmly welcomed by shareholders who have been informed that in the absence of unforeseen circumstances the present rate of distribution will be maintained on the increased capital. But this is not all, for the Corporation has expressed its aim of capitalizing further reserves from time to time in the future "when the situation so warrants" along the same lines as at present proposed.

In these circumstances, Anglo American 10s. shares—which are anyway regarded as an outstanding growth proposition—become even more attractive. At their present price of about 135s. the yield at present offered amounts to just about 5 per cent.

## FUTURE OF ALUMINIUM LTD.

The yield of no more than 1¾ per cent offered by Aluminium Ltd. shares at their current London quoted price of $240 reflects, of course, market expectation that the company's projected production expansion will bring with it sharp rises in future distribution. At the same time, and this seems to be fully appreciated, higher payments must be delayed by the enormous demands which current capital outlays are making, and must continue to make upon financial resources. Yet there are few doubts regarding future consumption levels, and unmistakable signs have appeared which point towards an increase of present uses which, together with the introduction of new outlets for this essential metal, should fully absorb planned world production.

During its past financial year Aluminium Ltd. achieved record levels of production, sales and earnings, and made a net income of $55,657,372 compared with $48,193,952 which, on the basis of equity capital outstanding at the year end, represented $5.56 per share compared with $4.83 in 1955. Consolidated sales and operating revenues moved up to $483,000,000 in 1956 from $412,000,000 in 1955.

## GOLDS REACH NEW LOW

During the past week *The Financial Times Gold Share Index* declined to a new low of 69.1. Disappointment was still being voiced over the lack of any assistance for gold mines in the recent South African budget, added to which selling was reported from Paris sources.

Business news in the U.S. was generally disheartening, and markets were dull. In London, however, the possibility of another round of inflation being touched off by wages settlements under present industrial disputes, stimulated investment buying. The impending budget, together with a relaxation of Australian import controls, and an improving Middle Eastern situation, all favourably assisted sentiment.

A higher floor price under the I.T.A. caused widespread rises in tins, but coppers were generally weaker. Apart from Amits, which put on about 4s., diamonds declined. Platinums held firm and some good rises took place amongst Australian lead/zincs.

## FALCON'S GOOD DEVELOPMENT

At the meeting of Falcon Mines held earlier this week, Mr. E. B. Papenfus, the chairman, stated that development results since the end of the company's financial year had continued to be satisfactory. Of 2,045 ft. sampled, 1,095 ft. had been payable averaging 5.1 dwt. per ton over 69 in. Tonnage milled at the Dalny mine during five months since September 30, 1956, at 79,000 tons had yielded 3.56 dwt. per ton, giving working profits of £41,384. At the Sunace and Bay Horse mines, estimated working profits for the same period were £2,496 and £2,351 respectively.

### RECENT FINAL DIVIDEND ANNOUNCEMENTS

| *Company* | *Year Ended* | *Final Dividend* | *Net Profit after tax* | | *Total Dividend* | |
|---|---|---|---|---|---|---|
| | | | *This* | *Last* | *This* | *Last* |
| | | | (£000) | (£000) | % | % |
| Anglo American Corp. .. .. | 31.12.56 | 50 | 4,419 | 5,049 | 70 | 70 |
| British Aluminium (*a*) .. .. | 31.12.56 | 8 | 1,494 | 1,372 | 12 | 12 |
| Union Corporation .. .. | 31.12.56 | 80 | 1,973 | 1,120 | 120 | 110 |

(*a*) 1956 distribution on increased capital. Profit figures shown after depreciation, replacements reserve, minority interests and taxation.

# FALCON MINES, LTD.

## CHAIRMAN'S ADDITIONAL REMARKS

The Forty-seventh annual general meeting of Falcon Mines, Ltd., was held on March 26 at Bulawayo, Southern Rhodesia.

**Mr. E. B. Papenfus,** chairman, presided.

The Chairman said:—The directors' Report and Accounts for the year ended September 30, 1956, together with my Review, have been in your hands for some time and are now before you. The affairs and operations of the company during that year are fully dealt with in the Report and Review and it is therefore only necessary for me to supply you with the results of operations since the close of the financial year.

The tonnage milled at the Dalny Mine for the five-month period since September 30, 1956, was 79,000 tons, which yielded 14,055 ounces fine of gold, equal to a recovery of 3.56 dwts. per ton milled. The working profit at the mine for that period, based on a selling price of gold of 245/6d. per ounce, was £41,384. In addition £2,177 accrued from sales of gold at prices above 245/6d. per ounce in respect of gold produced during three months ended December 31, 1956.

Development results since the close of the year continue to be satisfactory. The total footage advanced was 3,440, of which 2,045 feet were sampled and 1,095 feet, equal to 53.5%, were payable, averaging 5.1 dwts. per ton over a width of 69 inches.

At the Sunace and Bay Horse Mines the estimated working profits for the five months were £2,496 and £2,351 respectively.

The working profit for the three mines for the period was thus £48,408, excluding additional revenue which will accrue from the sales of gold at prices in excess of 245/6d. per ounce for the months of January and February, 1957.

On March 11, Dividend No. 7 of 4½d. per share, equivalent to 7½%, was declared payable to Shareholders registered on March 30, 1957. This is the same as declared in March, 1956. It is expected that dividend warrants will be posted on or about May 9, 1957.

I now move "that the directors' report and accounts for the year ended September 30, 1956, as submitted at this meeting, be approved and adopted and that all matters and things undertaken and discharged by the directors on behalf of the company be, and they are, hereby confirmed."

The report and accounts were adopted.

The Special Resolution for the adoption of new Articles of Association was passed.

**AGENCE MINIÈRE ET MARITIME S A**
2, RUE VAN BREE - ANTWERP - BELGIUM
***Sworn weighers, samplers of ores, metals and residues.***
***Agents for shippers at European ports and plants.***
Telegrams: Rentiers-Antwerp Telex 3196

# Publications Received

*Continuous Mining*, a pamphlet published by Joy-Sullivan Ltd., contains interesting articles on continuous mining in Britain, the Joy Continuous Miner, loading and transportation for continuous mining, as well as notes on such ancillaries as extensible belt conveyors, shuttle cars, loaders and idlers. An interesting publication.

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*The Story of Kuwait*, published by Kuwait Oil Co., Ltd., comprises 80 pages and is widely illustrated throughout. This is a pleasing and interesting publication.

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*The Geology of the Superficial Deposits and Coastal Sediments of British Guiana*, by D. Bleackley, has been received. Published by The British Guiana Geological Survey, as Bulletin 30 at $3.00 (12s. 6d.) the survey comprises a revision of Bulletin II, published in 1936, and was undertaken primarily to incorporate the information accumulating from the continued drilling of artesian wells along the coast since that time. The work is made up of 46 pages and a docket of maps is attached.

*

International trade expanded greatly in 1955 and reached an all-time peak, according to the *Yearbook of International Trade Statistics 1955* published by the Statistical Office of the United Nations. Total imports were about $88,000,000,000, or 11 per cent higher than in 1954, while total exports were almost $83,000,000,000, a gain of 9 per cent. These figures exclude the U.S.S.R., eastern Europe and mainland China. The yearbook gives several summary tables and detailed commodity analysis for 104 countries.

METALLURGICAL ENGINEER to take charge of ferro-manganese plant which is now under erection in India. Should be available end of October. Must be experienced in operating rotating hearth closed top ferro-manganese furnaces of the Elkem type. Age no bar if right man. Terms: minimum £3,500 per year and bonus, and it is expected that there will be other financial considerations. Plus free bungalow and other Company facilities such as provident fund, free medical aid, first-class transportation from and to home after every three years and six months' leave at full salary. Write Box No. 600, The Mining Journal Ltd., 15 Wilson Street, Moorgate, London, E.C.2.

RIO TINTO COMPANY OF SOUTH AFRICA LIMITED is considering the appointment of a General Manager for a large Mining Project in Southern Africa.

The position, which will be well remunerated, calls for a man of experience in the control of a large mining enterprise together with a complex Base Metal Reduction Plant.

Responsibilities will be of a wide nature, within the Group Structure of the Rio Tinto Company, and are intended to cover co-ordination of the project from Research, through planning and construction, to production.

Communications, in strict confidence, are invited from persons who might be interested in this position and should contain as much relevant information as possible.

Replies should be addressed, in writing, to Rio Tinto Management Services South Africa (Pty.) Ltd., P.O. Box 2915, Johannesburg, South Africa.

QUALIFIED MINERAL DRESSING ENGINEER, with school aged family, requires appointment in the United Kingdom. Has held senior positions in cyanidation, flotation, gravity and magnetic separation plants, and gained good experience of mineral dressing laboratory testing and plant design. Would be an asset to consultant company. Available in May. Box No. 599, The Mining Journal Ltd., 15 Wilson Street, Moorgate, London, E.C.2.

CAMBORNE SCHOOL OF METALLIFEROUS MINING

**Principal: G. A. Whitworth, O.B.E., A.C.S.M., M.I.M.M.**

This School, possessing its own mine, is situated in the centre of the mining district of Cornwall. The Course for the Associateship (A.C.S.M.) is of three years' duration and offers a balanced combination of theoretical and practical instruction in metalliferous mining.

Immediate application is essential for the 1957-58 session, which will commence on September 25, 1957.

*Summer Vacation Courses*—1957.

"*Geology of Cornwall.*" July 8 to August 2, 1957. This course is intended for 2nd and 3rd Year students of Geology and for Mine and Quarry Engineers.

"*Surveying.*" July 8 to August 9, 1957. The work undertaken is mainly topographical and is intended for students who have had an elementary training in the use of instruments and presents an opportunity of a refresher course for Mine and Quarry Engineers.

Further particulars may be obtained from the Secretary, Camborne School of Metalliferous Mining, Camborne, Cornwall.